

## Chemical-Mechanical Planarization Using Ozone

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### ABSTRACT

5       The present invention relates to the use of ozone ( $O_3$ ) as a reagent in chemical  
mechanical planarization either in aqueous solution or as a gas directly impinging on the  
surface to be planarized. An aqueous solution containing ozone may optionally contain  
abrasive particles and/or additional CMP reagents co-dissolved with the ozone including  
10       carbonate and bicarbonate anions, and organic acids such as formic, oxalic, acetic and  
glycol. Abrasives that may be added include alumina, silica, spinel, ceria, zirconia.  
Typical concentrations of ozone aqueous solution are in the range from approximately 1  
part-per-million up to saturation. Ammonium salts, particularly ammonium carbonate  
facilitate planarization in cooperation with ozone-containing aqueous solution. Low k  
15       dielectric materials, organic as well as inorganic, and difficult to oxidize metals can be  
planarized with ozone reagents pursuant to the present invention.